MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015 / 2016

PEM0046 – INTRODUCTION TO PROBABILITY AND STATISTICS

(All sections / Groups)

02 JUNE 2016
9:00 a.m. – 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of **FOUR** printed pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. Statistical table is provided.

Answer ALL questions [100 marks].

QUESTION 1 [25 marks]

a. A fair six sided dice is rolled twice. If the number in the second roll is greater than the first roll, the player wins the difference of the rolled numbers. If the number in the second roll is less than the first roll, the player loses the difference of the rolled numbers. If the rolled numbers are equal, the player neither wins nor loses. Let X denotes the winnings of the player.

i. Determine the probability distribution function of X. [8 marks]

ii. Calculate the mean and standard deviation for this probability distribution. [5 marks]

b. The shelf life, measured in unit of 100 hours, for a certain bakery product is a random variable X with the density function

$$f(x)=\begin{cases} cx^2 & , 0<x<1 \\ 2x-cx, & 1\le x<2 \\ 0 & ,\text{elsewhere} \end{cases}$$

i. Find the value of c. [4 marks]

ii. Find the probability that the product will have shelf life of less than 150 hours. [4 marks]

iii. Find the expected value of the shelf life of the product. [4 marks]

QUESTION 2 [25 marks]

a. Scores for a civil service exam are normally distributed with a mean of 75 and a standard deviation of 6.5. Find the probability that the scores of the civil exam will be

i. more than the population mean by at least 3 standard deviation. [4 marks]

ii. less than the population mean by 5 or more. [5 marks]

iii. To be eligible for civil service employment, you must score in the top of 5%. What is the lowest score to be eligible for the employment? [4 marks]
[Leave your answer in an integer].

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QUESTION 2 (Continued...)

b. Suppose that the mean number of arrivals of customers of a shop per minute is 4.

i. What is the probability that 3, 4 or 5 customers will arrive during the third minute? [2 marks]

ii. What is the probability that less than three customers will arrive during the first minute and exactly four customers will arrive in the next two minutes? [4 marks]

c. Michael was given a bag of marbles. There are yellow, blue and green marbles in the bag. n marbles are chosen at random from the bag one by one with replacement. If the mean and standard deviation of the number of yellow marbles chosen from the bag are 15.2 and 1.91 respectively, find the value of n. [6 marks]

QUESTION 3 [25 marks]

a. The scores of all 5 students in an exam are as below:

81 48 55 30 48

i. List all the possible samples of size two from this data and construct a sampling distribution of the sample mean. [8 marks]

ii. Calculate sampling error for each sample. [4 marks]

iii. If we take a random sample of 2 members from this population which includes the marks 30 and 48, then calculate the non-sampling error if we mistakenly record the last score as 46 instead of 48. [3 marks]

b. According to a survey conducted by Professor Gana, the mean score on the probability attitude test of all engineering students at a university was 58 with a variance of 16. If a sample of 60 students is randomly chosen, find the probability that the mean score of the probability attitude test will be

i. between 57 and 60. [5 marks]

ii. more than the population mean by at least 0.5. [5 marks]

Continued...

QUESTION 4 [25 marks]

A survey was conducted by a XYZ marketing firm to determine the relation between monthly advertising expenditures, x and sales volume, y.

x	40	20	50	25	25	20	40	50
y	440	400	510	450	395	365	525	550

a. Find the equation of the least square regression line to predict monthly sales from advertising expenditures. [13 marks]

b. Plot the scatter diagram and the least square regression line on the same graph. Describe the relationship between the two variables. [5 marks]

c. Estimate the sales volume if the advertising expenditure is 35. [2 marks]

d. Calculate the linear correlation coefficient and give your comment on the value obtained. [5 marks]

(Note: For Question 4, leave all your answers in 3 decimal points)

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